STLE 1989
COMBINED SUBJECT AND AUTHOR INDEX

Each paper published during the indexed period is assigned a sequence number, the first two digits of which indicate the year in which the paper was published. The index may be entered either through the Subject Listing or the Author Listing. The former comprises an alphabetical list of primary keywords, perhaps with associated secondary keywords, together with sequence numbers of papers of which the keywords are descriptive. The latter comprises an alphabetical listing of all authors of indexed papers, together with corresponding sequence numbers. Having determined the sequence numbers associated with a given subject or author, the papers to which these numbers refer may be found in the Chronological Listing. This Listing provides a complete reference for all papers published in *Lubrication Engineering* (L), *Tribology Transactions* (T) and *Special Publications* (SP). The papers are listed by Author(s), Title, Publication, Volume Number (bold type), Issue Number, and Page Numbers and are in order of ascending sequence number.

An excellent source of general information in the field of lubrication is the *Handbook of Lubrication*, edited by E. R. Booser and published by CRC Press under the sponsorship of STLE.

1989 Chronological Listing

89001 **Braza, J. F., Cheng, H. S., Fine, M. E., Gangopadhyay, A. K., Keer, L. M.** and **Worden, R. E.**, "Mechanical Failure Mechanisms in Ceramic Sliding and Rolling Contacts," **T32**, 1, 1-8.

89002 **Chen, H. M.**, "Magnetic Bearings and Flexible Rotor Dynamics," **T32**, 1, 9-15.

89003 **Fujita, T., Sogabe, T., Todoroki, T., Koga, T., Hirabayashi, H., Nakazawa, K.** and **Takeshita, K.**, "Development of Rotary Shaft Seals for Primary Coolant Pumps for Nuclear Reactors," **T32**, 1, 16-29.

89004 **Gardos, M. N.**, "The Effect of Anion Vacancies of the Tribological Properties of Rutile (TiO_{2-x}) Discussion of STLE paper 88054, T31, 4, 427-436," **T32**, 1, 30-31.

89005 **Heshmat, H., Pinkus, O.** and **Godet, M.**, "On a Common Tribological Mechanism Between Interacting Surfaces," **T32**, 1, 32-41.

89006 **Kato, K., Osaki, H.** and **Kayaba, T.**, "The Lubricating Properties of Tribo-Coating Films of Pb-Sn Alloys in High Vacuum," **T32**, 1, 42-46.

89007 **Kennedy, J. S., Sabhapathy, P.** and **Rodkiewicz, C. M.**, "Transient Thermal Effects in an Infinite Tilted-Pad Slider Bearing," **T32**, 1, 47-53.

89008 **Malik, M., Rahmatabadi, A. D.** and **Jain, S. C.**, "An Assessment of the Stability Chart of Linearized Gas-Lubricated Plain Journal Bearing System," **T32**, 1, 54-60.

89009 **Malik, M., Bhargava, S. K.** and **Sinhasan, R.**, "The Transient Response of a Journal in Plain Hydrodynamic Bearing During Acceleration and Deceleration Periods," **T32**, 1, 61-69.

89010 **Plaza, S.**, "The Studies of Dibenzyl Disulfide Tribochemical Reactions in the Presence of Other Additives," **T32**, 1, 70-76.

89011 **Trabelsi, R., Treheux, D., Orange, G., Fantozzi, G., Homerin, P.** and **Thevenot, F.**, "Relationship Between Mechanical Properties and Wear Resistance of Alumina-Zirconia Ceramic Composites," **T32**, 1, 77-84.

89012 **Wang, N.**, "The Transformation of Soft-Abrasive Wear Into Hard-Abrasive Wear Under the Effect of Frictional Heat," **T32**, 1, 85-90.

89013 **Wang, S. S., Maheswari, S. P.** and **Tung, S. C.**, "The Nature of Electrochemical Reactions Between Several Zinc Organodithiophosphate Antiwear Additives and Cast Iron Surfaces," (corrected version of STLE paper 88048, T31, 3, 382-390 and T31, 4, 497-498), **T32**, 1, 91-99.

89014 **Zeidan, F. Y.** and **Vance, J. M.**, "Cavitation Leading to a Two Phase Fluid in a Squeeze Film Damper," **T32**, 1, 100-104.

89015 **Chiu, Y. P.**, "An Improved Analysis of a Rectangular Swing Pad Thrust Bearing," **T32**, 2, 113-120.

89016 **Fusaro, R. L.**, "Comparison of the Tribological Properties of Fluorinated Cokes and Graphites," **T32**, 2, 121-132.

89017 **Gerhardt, L. J.** and **Wayner, P. C. Jr.**, "Interfacial Phenomena in Change-of-Phase Heat Transfer: Low Concentration Polymer Solutions," **T32**, 2, 133-140.

89018 **Gupta, V. K., Snyder, C. E. Jr., Gschwender, L. J.** and **Chen, G. J.**, "Thermal Decomposition Investigations of Candidate High Temperature Base Fluids Part 2: Model Silahydrocarbons," **T32**, 2, 141-146.

89019 **Hanson, M. T., Keer, L. M.** and **Farris, T. N.**, "Energy Dissipation in Non-Hertzian Fretting Contact," **T32**, 2, 147-154.

89020 **Khonsari, M. M.** and **Brewe, D. E.**, "On the Performance of Finite Journal Bearings Lubricated with Micropolar Fluids," **T32**, 2, 155-160.

89021 **Derdouri, A.** and **Carreau, P. J.**, "Non-Newtonian and Thermal Effects in Journal Bearings," **T32**, 2, 161-169.

89022 **Lewis, D. W., Allaire, P. E.** and **Thomas, P. W.**, "Active Magnetic Control of Oscillatory Axial Shaft Vibrations in Ship Shaft Transmission Systems Part 1: System Natural Frequencies and Laboratory Scale Model," **T32**, 2, 170-178.

89023 **Lewis, D. W., Humphris, R. R.** and **Thomas, P. W.**, "Active Magnetic Control of Oscillatory Axial Shaft Vibrations in Ship Shaft Transmission Systems Part 2: Control Analysis and Response of Experimental System," **T32**, 2, 179-188.

89024 **Lipschitz, A.**, "Dynamic Performance of the Stepped Hydrostatic Circumferential Gas Seal," **T32**, 2, 189-196.

89025 **Molyneaux, A. K.** and **Leonhard, M.**, "The Use of Spiral Groove Gas Bearings in a 350,000 rpm Cryogenic Expander," **T32**, 2, 197-204.

89026 **Prashad, H.**, "Diagnosis of Deterioration of Lithium Greases Used in Rolling-Element Bearings by X-ray Diffractometry," **T32**, 2, 205-214.

89027 **Vaidyanathan, K.** and **Keith, T. G. Jr.**, "Numerical Prediction of Cavitation in Noncircular Journal Bearings," **T32**, 2, 215-224.

89028 **Vijayaraghavan, D.** and **Keith, T. G. Jr.**, "Development and Evaluation of a Cavitation Algorithm," **T32**, 2, 225-233.

89029 **Singh, D. V., Sinhasan, R.** and **Pal, R.**, "Performance Characteristics of an Ungrooved Big-End Bearing with Misalignment," **T32**, 2, 234-238.

89030 **Van Helden, A. K., Vroegop, P. H.** and **Jongh, J. J. M.**, "Dynamic Adsorption in Mixed Lubrication," **T32**, 2, 239-245.

89031 **Van Alsten, J.** and **Granick, S.**, "Friction Measured with a Surface Forces Apparatus," **T32**, 2, 246-250.

89032 **Yamamoto, Y.** and **Gondo, S.**, "Friction and Wear Characteristics of Molybdenum Dithiocarbamate and Molybdenum Dithiophosphate," **T32**, 2, 251-257.

89033 **Ponnaganti, V., Kane, T. R.** and **White, J. W.**, "Simulation of Head-Disk Collisions in Magnetic Recording," **T32**, 2, 258-266.

89034 **Brockwell, K. R.** and **Kleinbub, D.**, "Measurements of the Steady State

Operating Characteristics of the Five Shoe Tilting Pad Journal Bearing," **T32**, 2, 267-275.

89035 **Gupta, V. K., Snyder, C. E. Jr., Gschwender, L. J.** and **Fultz, G. W.**, "Thermal Decomposition Investigations of Candidate High Temperature Base Fluids Part I. Silahydrocarbons," **T32**, 2, 276-280.

89036 **Hamer, J. C., Sayles, R. S.** and **Ioannides, E.**, "Particle Deformation and Counterface Damage When Relatively Soft Particles are Squashed Between Hard Anvils," **T32**, 3, 281-288.

89037 **Tian, H., Saka, N.** and **Suh, N. P.**, "Boundary Lubrication Studies on Undulated Titanium Surfaces," **T32**, 3, 289-296.

89038 **Jain, S. C., Sinhasan, R.** and **Pilli, S. C.**, "A Study on the Dynamic Response of Compliant Shell Journal Bearings," **T32**, 3, 297-304.

89039 **Kannel, J. W.** and **Barber, S. A.**, "Estimate of Surface Temperatures During Rolling Contact," **T32**, 3, 305-310.

89040 **Ham, G. L., Hahn, G. T., Rubin, C. A.** and **Bhargava, V.**, "Finite Element Analysis of the Influence of Kinematic Hardening in Two-Dimensional, Repeated, Rolling-Sliding Contact," **T32**, 3, 311-316.

89041 **Vaughn, M. R.** and **Rylander, H. G. Jr.**, "A Clearance Sensing Restrictor for Hydrostatic Bearings," **T32**, 3, 317-324.

89042 **DellaCorte, C.**, "Tribological Properties of Alumina-boria-silicate Fabric From 25°C to 850°C," **T32**, 3, 325-330.

89043 **Yust, C. S.** and **Allard, L. F.**, "Wear Characteristics of an Alumina-Silicon Carbide Whisker Composite at Temperatures to 800°C in Air," **T32**, 3, 331-338.

89044 **Fenske, G. R.**, "Nitride and Carbide Coatings for High Speed Steel Cutting Tools," **T32**, 3, 339-345.

89045 **Colynuck, A. J.** and **Medley, J. B.**, "Comparison of Two Finite Difference Methods for the Numerical Analysis of Thermohydrodynamic Lubrication," **T32**, 3, 346-356.

89046 **Gates, R. S., Hsu, S. M.** and **Klaus, E. E.**, "Tribochemical Mechanism of Alumina With Water," **T32**, 3, 357-363.

89047 **Zhu, D.** and **Cheng, H. S.**, "An Analysis and Computational Procedure for EHL Film Thickness, Friction and Flash Temperature in Line and Point Contacts," **T32**, 3, 364-370.

89048 **Blanchet, T. A.** and **Kennedy, F. E. Jr.**, "The Development of Transfer Films in Ultra-High Molecular Weight Polyethylene/Stainless Steel Oscillatory Sliding," **T32**, 3, 371-379.

89049 **Miyoshi, K., Hattori, S., Okada, T.** and **Buckley, D. H.**, "Deformation and Fracture of Single-Crystal and Sintered Polycrystalline Silicon Carbide Produced by Cavitation," **T32**, 3, 380-388.

89050 **Saka, N., Tian, H.** and **Suh, N. P.**, "Boundary Lubrication of Undulated Metal Surfaces at Elevated Temperatures," **T32**, 3, 389-395.

89051 **Shang, L.** and **Dien, I. K.**, "A Matrix Method for Computing the Stiffness and Damping Coefficients of Multi-Arc Journal Bearings," **T32**, 3, 396-404.

89052 **Price, F. D.** and **Centers, P. W.**, "Microcomputer Simulation of Lubricant Degradation in Turbine Engines Using Laboratory Data," **T32**, 3, 405-409.

89053 **Belin, M., Martin, J. M.** and **Mansot, J. L.**, "Role of Iron in the Amorphization Process in Friction-Induced Phosphate Glasses," **T32**, 3, 410-413.

89054 **Cann, P. M.** and **Spikes, H. A.**, "Determination of the Shear Stresses of Lubricants in Elastohydrodynamic Contacts," **T32**, 3, 414-422.

89055 **Gates, R. S., Jewett, K. L.** and **Hsu, S. M.**, "A Study on the Nature of Boundary Lubricating Film: Analytical Method Development," **T32**, 4, 423-430.

89056 **Hashemi, S. M. R.** and **Roylance, B. J.**, "Steady-State Behavior of Squeeze Film Bearings Subjected to Harmonic Excitation—Including Fluid Inertia and System Effects," **T32**, 4, 431-438.

89057 **Braza, J. F., Cheng, H. S.** and **Fine, M. E.**, "Silicon Nitride Wear Mechanisms: Rolling and Sliding Contact," **T32**, 4, 439-446.

89058 **Tanaka, K., Takeuchi, Y., Odaka, T., Daitoh, H.** and **Miyake, Y.**, "Analytical Stability Criteria for Gas-Lubricated Sliders for Magnetic Disk Drive," **T32**, 4, 447-452.

89059 **Hoshi, M., Baba, Y.** and **Furuhama, S.**, "A Study of Piston Friction Force in an Internal Combustion Engine (Number 2)," **T32**, 4, 453-460.

89060 **Hashemi, S. M. R.** and **Roylance, B. J.**, "Analysis of an Oscillatory Oil Squeeze Film Including Effects of Fluid Inertia," **T32**, 4, 461-468.

89061 **Rhim, Y.** and **Tichy, J. A.**, "Entrance and Inertia Effects in a Slider Bearing," **T32**, 4, 469-479.

89062 **Key, W. E., Salant, R. F., Payvar, P., Gopalakrishnan, S.** and **Vaghasia, G.**, "Analysis of a Mechanical Seal with Deep Hydropads," **T32**, 4, 481-489.

89063 **Berthier, Y., Godet, M.** and **Brendle, M.**, "Velocity Accommodation in Friction," **T32**, 4, 490-496.

89064 **Ling, F. F.**, "The Possible Role of Fractal Geometry in Tribology," **T32**, 4, 497-505.

89065 **Lockwood, F. E., Bridger, K.** and **Hsu, S. M.**, "Heats of Immersion, Friction, and Wear of Base Oil Fractions," **T32**, 4, 506-516.

89066 **Parszewski, Z. A.** and **Krynicki, K.**, "Rotor-Bearings Systems Stability: Composition Approach with Bearing Shape Function Presentation," **T32**, 4, 517-523.

89067 **Kimura Y.** and **Okada, K.**, "Lubricating Properties of Oil-In-Water Emulsions," **T32**, 4, 524-532.

89068 **Godfrey, D.**, "Clean Dry Oils Prolong Life of Lubricated Mechanisms," **L45**, 1, 4-8.

89069 **Pei, P., Hsu, S. M., Weeks, S.** and **Lawson, R.**, "Chemiluminescence Instrumentation for Fuel and Lubricant Oxidation Studies," **L45**, 1, 9-15.

89070 **Jain, V. K., Wright, M. S.** and **Saba, C. S.**, "Investigation of Ester Based Lubricants Using a Four Ball Machine," **L45**, 1, 17-22.

89071 **Kiryu, K., Tsuchiya, K., Yonehara, Y., Shimomura, T.** and **Koga, T.**, "An Investigation of Deposits Formation on Sealing Surfaces of Water Pump End Face Seals," **L45**, 1, 49-55.

89072 **Hombek, R., Heenan, D. F., Januszkiewicz, K. R.** and **Sulek, H. H.**, "Oxidation of Aluminum Cold Rolling Base Oils," **L45**, 1, 56-64.

89073 **Kuo, L. L. K., Chang, S. T., Hsieh, S. K., Chu, C. Y.** and **Tung, C. Y.**, "Fuel Economy Engine Oils Via Friction Modifiers," **L45**, 2, 81-90.

89074 **Papay, A. G.**, "Automatic Transmission Fluids Dexron II and Beyond," **L45**, 2, 121-128.

89075 **Sasaki, A., Kawasaki, M., Sakai, T., Kojima, H.** and **Takayama, S.**, "A Study of Hydraulic Valve Problems," **L45**, 3, 140-146.

89076 **Kauffman, R. E.**, "Particle Size and Composition Analyses of Wear Debris Using Atomic Emission Spectrometry," **L45**, 3, 147-153.

89077 **Joseph, J. J.**, "Basic Concepts of Roll Coolant Filtration," **L45**, 3, 157-150.

89078 **Roby, S. H., Patterson, G. H.** and **O'Connor, B. M.**, "Investigation of Sequence IIID Valve Train Wear Mechanisms," **L45** 3, 177-184.

89079 **Leder, J.** and **Russo, M. R.**, "Biocide Usage in Metalworking Fluids: The Effect of Treatment Patterns on Efficacy," **L45**, 4, 217-220.

89080 **Treverton, J. A.**, "The Composition and Structure of the Surface Film Formed on Aluminum Foil Mill Rolls," **L45**, 4, 223-232.

89081 **Heshmat, H.** and **Shapiro, W.**, "High-Temperature, Unbalanced, Dry Contact Face Seal, Interfacial Phenomenon, and Design Considerations," **L45**, 4, 235-242.

89082 **Mayer, E.**, "Performance of Rotating High Duty Nuclear Seals," **L45**, 5, 275-286.

89083 **Marsi, J. A.**, "Development of a 9 Inch (228 mm) Nuclear Primary Coolant Seal," **L45**, 5, 311-321.

89084 **Young, L. A.** and **Lebeck, A. O.**, "The Design and Testing of a Wavy-Till-Dam Mechanical Face Seal," **L45**, 5, 322-329.

89085 **Keller, M. A.** and **Saba, C. S.**, "Monitoring of Ester Base Lubricants by Dielectric Constant," **L45**, 6, 347-351.

89086 **Kyle, D. J., Gladue, R.** and **Vail, P.**, "Biodeuteration: A Novel Method for the Production of Deuterated Lubricants," **L45**, 6, 355-359.

89087 **Kirk, T. E., Riddle, B. I.** and **Kipp, E. M.**, "The Functional Properties of Aqueous Aluminum Rolling Lubricants Are Different," **L45**, 6, 377-381.

89088 **Sokolovic, S.** and **Arsic, S.**, "Influence of the Ratio of Monoaromatics to Polyaromatics on the Thermooxidation of the Hydrotreated Base Oils," **L45**, 6, 383-385.

89089 **Law, J. B.**, "Field Evaluation of Octhilinone as a Fungicide for Metalworking Fluids—A Case History," **L45**, 7, 411-415.

89090 **Kamo, R.** and **Valdmanis, E.**, "Tribological Properties of Some Selected Materials in a Coal-Fired Environment," **L45**, 7, 417-423.

89091 **Mosher, E.** and **Sköld, R.**, "The Chemical Control of Phosphine Gas Generation During the Machining of Nodular Cast Iron," **L45**, 7, 445-450.

89092 **Little, L.**, "New Technique for Evaluating State-of-Cure of Elastomers for Seals," **L45**, 8, 473-477.

89093 **Needelman, W. M.** and **Fiumano, F. A.**, "Controlling Grinding Coolant Contamination in an Automotive Manufacturing Plant—A Case Study," **L45**, 8, 479-484.

89094 **Fragoulis, A. N., Nichols, A. H.** and **Henein, N. A.**, "Error Analysis of Time-Dependent Frictional Torque in Reciprocating Engines: Effect of Angular Velocity Measurement," **L45**, 8, 493-499.

89095 **Clayton, P., Danks, D.** and **Steele, R. K.**, "Laboratory Assessment of Lubricants for Wheel/Rail Applications," **L45**, 8, 501-506.

89096 **Childers, J. C.**, "Metalworking Fluids—A Geographical Industry Analysis," **L45**, 9, 542-546.

89097 **Barnes, J. R.** and **Bell, J. C.**, "Laboratory Screening of Engine Lubricants for High Temperature Performance," **L45**, 9, 549-555.

89098 **Corso, S.** and **Adamo, R.**, "The Application of Ferrography in Monitoring Motor Oils During Engine Development," **L45**, 9, 557-564.

89099 **Papke, B. L., Dahlstrom, P. L.** and **Kreuz, K. L.**, "Surface Characterization of Model Lubricant-Derived Diesel Engine Piston Deposits," **L45**, 9, 575-585.

89100 **Blau, P. J.**, "The Units of Wear—Revisited," **L45**, 10, 609-614.

89101 **Leugner, L. O.**, "The Use of Oil Contamination Testing Combined With Improved Filtration Will Optimize Both Lubricant and Equipment Life," **L45**, 10, 618-624.

89102 **Logan, M. R.** and **Shamah, E.**, "Multigrade Railroad Lubricants—Fuel Savings and Field Performance in 2-Stroke and 4-Stroke Engines," **L45**, 10, 625-633.

89103 **Logan, M. R., Stanley, R. M.** and **Hamilton, G. D. S.**, "Multigrade Engine Oil Consumption Benefits—Results of a Field Test in Railroad Service," **L45**, 10, 639-647.

89104 **Harris, T. A.** and **Wedeven, L. D.**, "Rolling Bearing Tribology—Past, Present and Future," **L45**, 11, 673-682.

89105 **Odi-Owei, S.**, "Tribological Properties of Some Vegetable Oils and Fats," **L45**, 11, 685-690.

89106 **Brockman, N. L.** and **Morris, P. L.**, "The Optical Measurement of Lubricant Levels on Lacquered Can-End Stock," **L45**, 11, 693-697.

89107 **Rush, R. E.**, "Twenty Years of Change in Lubrication; What's New in Work Roll Bearings," **L45**, 11, 698-705.

89108 **Kauffman, R. E.**, "Development of a Remaining Useful Life of a Lubricant Evaluation Technique. Part III: Cyclic Voltammetric Methods," **L45**, 11, 709-716.

89109 **Klaus, E. E., Jeng, G. S.** and **Duda, J. L.**, "A Study of Tricresyl Phosphate as a Vapor Delivered Lubricant," **L45**, 11, 717-723.

89110 **Klimek, E. J.**, "Anomalies in the Microstructure of Reaction Bonded Silicon Carbide (RBSiC)," **L45**, 12, 745-749.

89111 **Rounds, F. G.**, "Effect of Detergents on ZDP Antiwear Performance as Measured in Four-Ball Wear Tests," **L45**, 12, 761-769.

89112 **Roby, S. H.** and **Reba, R. M.**, "Investigation of Sequence IIID Valve Train Wear Mechanisms. Part II. The Influence of Manganese Phosphating on Wear Performance," **L45**, 12, 773-782.

89113 **Shimomura, T., Kiryu, K., Hirabayashi, H.** and **Nakajima, T.**, "A Study of the Relationship Between Sealing Performance and Surface Characteristics of End Face Seals," **L45**, 12, 785-791.

89114 **Alexander, D. L., Kapuscinski, M. M.** and **Laffin, M. V. Jr.**, "Shear Stability Index of VI Improvers; Its Dependency on Method of Determination," **L45**, 12, 801-806.

89115 **Adams, G. G.**, "A Novel Approach to the Foil Bearing Problem," **SP-26**, 1-7.

89116 **Agarwal, A. K., Shih, C. Y., Harper, M. A.** and **Bauer, C. L.**, "Effect of Surface Coatings on Sliding Friction and Wear of Thin-Film Magnetic Recording Media," **SP-26**, 8-14.

89117 **Arai, T.** and **Tagami, K.**, "Friction Characteristics for Double-Sided Perpendicular Recording Flexible Disks," **SP-26**, 15-20.

89118 **Hahn, F. W. Jr.**, "Historical Perspective of Tape Head Contours," **SP-26**, 21-27.

89119 **Izraelev, V. M.**, "2D Versus 3D Surface Roughness Measurement," **SP-26**, 28-32.

89120 **Kimachi, Y., Hoshino, M.** and **Terada, A.**, "Lubricant Evaporation Rate Constants and Head Sliding Durabilities of Rigid Magnetic Disks," **SP-26**, 33-39.

89121 **Koka, R.**, "Effects of Fine Particles on the Slider/Disk Interface in Rigid Disk Drives," **SP-26**, 40-46.

89122 **Koka, R.**, "Fine Particle Adhesion and Removal on Rigid Disks Using a Laser-Scanner," **SP-26**, 47-52.

89123 **Kumaran, A. R., Lue, K.** and **Talke, F. E.**, "The Effect of Leading Edge Taper Angle on the Flying Characteristics and Impact Response of Winchester Type Sliders," **SP-26**, 53-58.

89124 **Kumaran, A. R., Chang, C. H.** and **Zahn, C. C.**, "Interaction of Ambient Pressure and Steady State Performance Characteristics of Gas Lubricated Sliders," **SP-26**, 59-63.

89125 **Li, Z., Rabinowicz, E.** and **Saka, N.**, "The Stiction Between Magnetic Recording Heads and Thin Film Disks," **SP-26**, 64-70.

89126 **Marchon, B., Vierk, S., Heiman, N., Fisher, R.** and **Khan, M. R.**, "Significance of Surface Roughness Measurements. Application to the Tribology of the Head/Disc Interface," **SP-26**, 71-80.

89127 **Namura, K., Ota, H., Inanaga, K.** and **Ohmae, N.**, "Carbon-Coated Hard Disk Failure in Contact-Start-Stop Tests," **SP-26**, 81-87.

89128 **Smith, D. P.** and **Von Behren, R. A.**, "Squeeze-Film Analysis of Tape Winding Effects in Data Cartridge," **SP-26**, 88-92.

89129 **Smith, S., Mee, P., Smallen, M.** and **Merchant, K.**, "Fabrication, Structure and Friction/Wear Properties of Carbon Overlayers," **SP-26**, 93-97.

89130 **Sundaram, R.** and **Benson, R. C.**, "A Green's Function With Improved Convergence for Cylindrically Wrapped Tapes," **SP-26**, 98-110.

89131 **Suzuki, S.** and **Kennedy, F. E. Jr.**, "Incipient Damage on Thin Film Magnetic Disks and Its Detection With a Corrosion Test," **SP-26**, 111-119.

89132 **Van Groenou, A. B., Fijnvandraat, J. G., Kadijk, S. E.** and **Verbunt, J. P. M.**, "The Shape of Heads for Tape Recording: Experiments and Calculations for Various Tapes," **SP-26**, 120-127.

89133 **Walmsley, R. G., Brandt, J.** and **Natarajan, B. R.**, "Detection of Failure in Disk Wear Testing," **SP-26**, 128-134.

89134 **Watanabe, M., Yamada, T.** and **Terada, Y.**, "An Air Bearing Design for a Small Diameter Disk Drive," **SP-26**, 135-140.

89135 **White, J. W.**, "Analytical Study of Air Bearing Damping for Low Clearance Magnetic Head Sliders," **SP-26**, 141-147.

89136 **Yanagisawa, M.** and **Tsukamoto, Y.**, "Fatigue Life of Thin Film Materials for Magnetic Storage Devices," **SP-26**, 148-152.

89137 **Yanagisawa, M., Tsukamoto, Y.** and **Goto, F.**, "Wear Mechanism on Thermal Oxidation Film for Plated Magnetic Disks," **SP-26**, 153-159.

89138 **Zhu, L. Y.** and **Bogy, D. B.**, "Head-Disk Spacing Fluctuation Due to Disk Topography in Magnetic Recording Hard Disk Files," **SP-26**, 160-167.

89139 **Zhu, L. Y.** and **Bogy, D. B.**, "A Multi-Channel Laser Interferometer and Its Use to Study Head-Disk Interface Dynamics in Magnetic Disk Drives," **SP-26**, 168-179.

89140 **Anderson, D. P.**, "A Quantitative Method for the Determination of Large Particles in Lubricating Oil Samples Using ICP Spectrometry," **SP-27**, 1-9.

89141 **Homer, K. E.**, "Enhancing the Effectiveness of Oil Analysis As a Condition Monitoring Tool," **SP-27**, 10-13.

89142 **Lukas, M.**, "Development of an Automated, On-Line Tribology Based Maintenance Management System," **SP-27**, 14-23.

89143 **Rankin, D.**, "On-Line Phase Current Monitoring Fault Diagnosis in High Voltage Induction Motors," **SP-27**, 24-31.

89144 **Liu, Z., Feng, X., Shi, Y.** and **Xei, S.**, "Monitoring the Mechanical Work Condition by Determining Oxidation Products in Lubricant—Comparing IR Spectroscopy With Acidimetry," **SP-27**, 32-34.

89145 **Boyce, M. P., Meher-Homji, C. B.** and **Mani, G.**, "A Diagnostic Methodology for Condition Monitoring of High Speed Turbomachinery," **SP-27**, 35-45.

89146 **Centers, P. W.** and **Wright, R. L.**, "Future Trends in Turbine Engine Wear Metal Diagnostics," **SP-27**, 46-52.

89147 **Xu, D., Chen, J., Zhong, S.** and **Yin, L.**, "A New Diagnosis Function for Distinguishing the Wear State of Turning Tool Under Cutting Condition," **SP-27**, 53-60.

89148 **Johnston, K. D.** and **Martin, K. F.**, "Lubricant Pressure As a Condition Monitoring Parameter," **SP-27**, 61-68.

89149 **Van Der Spek, R.**, "Operating Experience With Large Sleeve Bearings on Rotary Cement Kilns," **SP-27**, 69-73.

89150 **Liu, J.**, "Simultaneous Determination of Wear Metals Amounts in Used Lubricating Oils by Ultraviolet Spectrophotometry," **SP-27**, 74-77.

89151 **Lewis, R. T.**, "The Mechanical Component of Wear, What Spectroscopy Doesn't Tell You," **SP-27**, 78-82.

89152 **Santoro, S. K., Seifert, W. W.** and **Westcott, V. C.**, "Examination of Tribological Problems Encountered With Large Diesel Engines," **SP-27**, 83-87.

89153 **Feng, X., Shi, Y.** and **Liu, Z.**, "Determination of the Viscosity of Petroleum Products by Near Infrared Analysis—Monitoring the Mechanical Work Condition," **SP-27**, 88-90.

89154 **Brown, K. J.** and **Staniewski, J. W.**, "Condition Monitoring and Maintenance of Steam Turbine-Generator Fire Resistant Triaryl Phosphate Control Fluids," **SP-27**, 91-96.

89155 **Carfagni, M.** and **Citti, P.**, "Automatic Image Processing and Recognition for Diagnosing Mechanical Systems," **SP-27**, 97-100.

89156 **Dominguez, D. D., Mowery, R. L.** and **Cheek, G. T.**, "Aryl Amine Antioxidants Determinations in Ester Lubricants," **SP-27**, 101-108.

89157 **Liu, J.** and **Deng, K.**, "Test Paper Method for Monitoring of Salt Content of Water in Used Lubricating Oils," **SP-27**, 109-113.

89158 **Dalley, R. J.**, "Advancements in Ferrography," **SP-27**, 114-118.

89159 **Veinot, D. E.** and **Fisher, G. C.**, "Wear Debris Examination As a Condition Monitoring Technique for the Sikorsky Sea King Helicopter Main Gearbox," **SP-27**, 119-131.

89160 **Jones, M. H.**, "Wear Debris Analysis of Grease," **SP-27**, 132-139.

89161 **Zeng, Z. X., Song, D. X.** and **Du, Y. P.**, "Application of Ferrography in Lubricant Maintenance and Condition Monitoring of Equipment," **SP-27**, 140-143.

89162 **Berryman, F., Michie, P., Smulders, A.** and **Vermeiren, K.**, "Condition Monitoring—A New Beginning—A Method of Monitoring Machines Using a High Frequency Acoustic Emission Technique," **SP-27**, 144-153.

89163 **Martin, K. F., Thorpe, P.** and **Hoh, S. M.**, "Condition Monitoring Hard Faults in a Machine Tool Coolant System," **SP-27**, 154-162.

89164 **Yang, Z.** and **Wang, X.**, "Monitoring Gear Failure Using KTP," **SP-27**, 163-168.

89165 **Tang, B.** and **Xing, Z.**, "Studies on the Antiwear Property of Micro-Carbon Particles in Diesel Engine Oil HC-14 and Its Correlation With Extending the Oil Service Life," **SP-27**, 169-175.

89166 **Lin, R. Z. W.**, "A Model for Predicting Grease-Lubricated Roller Bearing Characteristics," **SP-27**, 176-181.

89167 **Frenster, J. A., Roberts, D.** and **De Hoff, R. L.**, "Jet Engine Maintenance Information Management—The Unified Approach," **SP-27**, 182-186.

1989 Subject Index

Abrasion—*see* Wear.

Abrasives 89012 89037
see also Lubricant Analytical Techniques, Contaminants; Metalworking, Grinding.

Acoustical Phenomena 89147 89162
see also Vibration.

Additives
Antimicrobial 89079 89089
Antioxidant 89010 89013 89065 89072 89156
Antiwear 89010 89013 89030 89032 89053 89070 89109 89111 89165
Detergent/Dispersant 89111
Emulsifiers 89067
Extreme Pressure 89010 89030
Friction Modifying 89030 89032 89073
Solid Lubricant 89095
Viscosity Index Improver 89020 89021 89102 89103 89114
see also Grease; Lubricant Analytical Techniques; Lubricant Chemical Properties; Lubricant Physical Properties; Metalworking Fluids.

Additive Effects
Decomposition 89010 89013 89026
Depletion 89142 89156
Deposition 89010 89013 89030 89032 89053 89099 89109
Effectiveness—*see* Additives.
Interaction 89010 89111

Adhesion 89031

Adsorption—*see* Surface Films.

Aerospace Lubrication
Airplanes 89042 89052 89085 89108 89146 89156 89167
Helicopters 89159
Space 89006

Air Bearings—*see* Bearings, Gas.

Air Compressors—*see* Compressors.

Airplanes—*see* Aerospace Lubrication.

Aluminum—*see* Aluminum Plant Lubrication; Materials.

Aluminum Plant Lubrication 89072 89080 89087

Analysis—*see* Failure Analysis; Lubricant Analytical Techniques; Surface Chemical Analysis; Surface Roughness; Testing Devices.

Antimicrobial Additives—*see* Additives.

Antioxidants—*see* Additives.

Antiwear Additives—*see* Additives.

Atmosphere—*see* Environmental Effects on Lubrication.

Automatic Transmission Fluids—*see* Lubricants.

Automotive Lubricants—*see* Lubricants.

Automotive Lubrication 89029 89059 89071 89073 89074 89078 89094 89097 89098 89099 89111 89112 89113

Aviation Oils—*see* Lubricants.

Ball Bearings—*see* Bearings.

Basestocks—*see* Lubricants.

Bearings, Design, Lubrication and Performance of
Ball 89026 89036 89039 89047 89104 89162
Compliant 89038
Foil 89115 89118 89128 89130 89132
Gas 89008 89025 89033 89058 89115 89118 89119 89120 89121 89122 89123 89124 89125 89126 89128 89129 89130 89131 89133 89134 89135 89137 89138 89139
Hydrodynamic 89005 89007 89008 89009 89015 89020 89021 89027 89028 89029 89034 89036 89045 89051 89061 89066 89149
Hydrostatic 89041
Magnetic 89002 89022 89023
Multi-Lobe 89051
Roller 89026 89036 89039 89104 89107 89162 89166
Self-Lubricating 89004 89005 89006 89016 89048 89129
Squeeze-Film 89014 89056 89060 89128
Tilting-Pad 89007 89015 89034 89045

Blending—*see* Additives; Grease; Lubricants.

Boundary Lubrication 89005 89063
Chemistry 89004 89010 89013 89030 89031 89032 89046 89050 89053 89055 89065 89109 89111
Friction—*see* Friction.
Metallurgy 89004 89006 89012 89040
Temperature 89012 89030 89039 89050 89065
Wear—*see* Wear.

Cams 89030 89078 89112 89152

Carbides—*see* Coatings; Materials.

Carbon—*see* Materials.

Cavitation 89014 89027 89028 89049
see also Lubrication Regimes.

Cavitation Erosion—*see* Wear.

Cement Mill Lubrication 89149 89161

Ceramics—*see* Coatings; Materials.

Coatings
Wear Resistant 89004 89044 89078 89090 89110 89112 89116 89129 89131 89133 89136 89137
Solid Lubricant 89006 89016 89042 89116 89117 89127 89129 89131 89133
see also Additive Effects, Deposition; Solid Lubrication; Surface Films.

Compliant Bearings—*see* Bearings.

Composites—*see* Coatings; Materials.

Compressors 89113 89145
see also Pumps.

Condition Monitoring 89140 to 89167

Conservation
Energy 89073 89102

Contact, Deformation and Stress Analysis of 89001 89019 89036 89037 89040 89050 89064 89130 89136
see also Lubrication Regimes; Surface Roughness.

Contaminants—*see* Environmental Effects on Lubrication; Fatigue; Lubricant Analytical Techniques; Lubricant Chemical Properties; Wear, Particles.

Coolants—*see* Metalworking Fluids.

Copper—*see* Materials.

Corrosion 89131

Cutting—*see* Metalworking.

Cutting Oils—*see* Metalworking Fluids.

Dampers—*see* Bearings, Squeeze-Film; Squeeze-Film Lubrication.

Deformation—*see* Contact.

Detergents—*see* Additives.

Diesel Engines—*see* Engines, Internal Combustion.

Dispersants—*see* Additives.

Disposal of Lubricants—*see* Lubricant Supply and Disposal.

Distribution of Lubricants—*see* Lubricant Supply and Disposal; Lubrication Systems.

Elastohydrodynamic Lubrication
Film Geometry 89047 89067
Non-Newtonian 89067
Surface Roughness Effects 89104
Thermal Effects 89039 89047 89054
Traction 89047 89054

Elastomers—*see* Bearings; Materials; Seals.

Electrical Phenomena 89002 89013 89026 89085 89108 89131 89143
see also Lubricant Physical Properties.

Emulsifiers—*see* Additives.

Energy Conservation—*see* Conservation.

Engine Oils—*see* Lubricants.

Engines, Design, Lubrication and Performance of
Gas Turbine 89145 89146
Internal Combustion 89021 89029 89059 89073 89078 89090 89094 89097 89098 89099 89102 89142 89152 89165
Jet 89042 89052 89145 89146 89156 89167
Steam Turbine 89145 89154

Environmental Effects on Lubrication
Atmosphere 89004 89052
Chemical 89157
Humidity 89068 89125
Particulates 89012 89036 89037 89050 89068 89076 89081 89090 89121 89122 89140 89142 89152 89158
Vacuum 89006

Erosion—*see* Wear.

Extreme Pressure (EP) Additives—*see* Additives.

Failure Analysis 89001 89075 89098 89107 89112 89127 89131 89133 89152 89163
see also Fatigue; Scuffing; Testing Devices; Wear.

Fatigue
Fretting 89019
Life Prediction 89104
Lubricant Chemistry Effect 89105
Lubricant Contaminant Effect 89036 89068
Mechanisms 89001 89127 89136
Metallurgical Effect 89104
Testing Devices (novel) 89136

Ferrites—*see* Materials.

Ferrography—*see* Lubricant Analytical Techniques, Contaminants.

Film Thickness—*see* Lubrication Regimes; Surface Films; Testing Devices, Lubricant Film Thickness.

Films—*see* Coatings; Surface Films.

Filtration 89068 89075 89077 89101 89140 89151 89152

Finish—*see* Surface Roughness.

Fire-Resistant Fluids—*see* Lubricants.

Flash Temperature—*see* Elastohydrodynamic Lubrication; Thermal Effects.

Fluid Film Bearings—*see* Bearings.

Fluids—*see* Lubricants; Metalworking Fluids.

Foil Bearings—*see* Bearings.

Food Industry Lubrication 89106

Food-Grade Lubricants—*see* Lubricants.

Fretting 89019
see also Fatigue; Wear.

Friction
Boundary 89005 89030 89031 89032 89037 89050 89055 89063 89065 89067 89073 89095 89117
Elastohydrodynamic 89039 89047
Hydrodynamic 89005 89007 89020 89021 89034 89059
Self-Lubricated 89004 89005 89006 89048 89116 89117 89125 89126 89129 89131 89133
Solid Lubricated 89016 89042 89116 89117 89129 89131 89133
Stick-Slip 89125
Testing Devices (novel) 89031 89073 89094
Unlubricated 89004 89005 89006 89019 89031 89037 89042 89063 89116 89137
see also Additives, Friction Modifying.

Gas Bearings—*see* Bearings.

Gas Engines—*see* Engines, Internal Combustion.

Gas Lubrication 89008 89024 89025 89033 89058 89115 89118 89123 89124 89128 89130 89134 89135 89138 89139
see also Bearings, Gas.

Gas Turbines—*see* Engines.

Gasoline Engines—*see* Engines, Internal Combustion.

Gears, Design, Lubrication and Performance of 89047 89074 89164
Bevel, Spur, Helical 89159

Grease
Additives—*see* Additives; Additive Effects.
Chemical Properties 89026
Lubrication 89026 89095 89107 89160 89166
Physical Properties 89166

Grinding—*see* Metalworking.

Grinding Oils—*see* Metalworking Fluids.

Hardness Effects 89001 89004 89012 89036 89037 89040 89044 89050

Heat Transfer 89017 89039

Heat Treatment—*see* Hardness Effects; Metallurgical Effects.

Helicopters—*see* Aerospace Lubrication.

High-Temperature Lubrication 89004 89011 89018 89035 89042 89081 89097 89099 89109

History 89104

Humidity—*see* Environmental Effects on Lubrication.

Hydraulic Fluids—*see* Lubricants.

Hydraulic Systems 89075 89163

Hydrodynamic Bearings—see Bearings.

Hydrodynamic Lubrication
Cavitation—*see* Cavitation.
Film Geometry 89005 89015 89021 89029 89038 89061 89062 89138 89139
Friction—*see* Friction.
Load-Carrying Capacity 89007 89020 89021 89074 89061
Non-Newtonian 89020 89021
Surface Roughness Effects 89005
Stability 89008 89009 89025 89038 89051 89066 89135
Thermal Effects 89007 89021 89034 89045

Hydrostatic Bearings—*see* Bearings.

Hydrostatic Lubrication 89024 89041

Hygiene 89079 89091 89093

Inhibitors—*see* Additives.

Inspection—*see* Maintenance.

Internal Combustion Engine Oils—*see* Lubricants.

Internal Combustion Engines—*see* Engines.

Iron—*see* Materials.

Irradiation Effects—see Lubricants, Radiation Resistant; Nuclear Power Plant Lubrication.

Jet Engines—*see* Engines.

Jet Engine Oils—*see* Lubricants.

Lead—*see* Coatings; Materials.

Lubricant Analytical Techniques
Chemical Composition 89026 89153
Contaminants 89075 89076 89085 89098 89121 89122 89140 89141 89142 89146 89150 89151 89152 89157 89158 89159 89160 89164 89167
Physical Properties 89142 89153
Thermal and Oxidative Stability 89018 89035 89052 89069 89072 89085 89097 89108 89142 89144 89156 89167
see also Surface Chemical Analysis.

Lubricant Chemical Properties
Additive Response—*see* Additives; Additive Effects.
Contamination 89068 89075 89076 89077 89093 89157
Thermal and Oxidative Stability 89018 89035 89052 89069 89072 89085 89088 89097 89099 89108 89156 89165

Lubricant Physical Properties
Electrical Properties 89026 89085 89108
Non-Newtonian Behavior 89021 89114 89166
Shear Stability 89114
Surface Tension 89017 89065 89067
Traction, Shear Strength 89054
Vapor Pressure, Volatility 89017 89120
Viscosity 89153
see also Additives; Grease; Metalworking Fluids.

Lubricant Supply and Disposal
Disposal 89096
Distribution 89096
Marketing 89096
see also Grease; Lubrication Systems; Metalworking Fluids.

Lubricants
Automatic Transmission Fluids 89074
Basestocks 89065 89072 89088 89097
Coolants—*see* Metalworking Fluids Fire-Resistant Fluids 89154
Food-Grade Lubricants 89106
Greases—*see* Grease.
Hydraulic Fluids 89075 89107
Internal Combustion Engine Oils 89021 89073 89078 89097 89098 89099 89102 89103 89111 89112 89152 89165
Jet Engine Oils 89052 89085 89108
Metalworking Oils—*see* Metalworking Fluids.
Solid Lubricants—*see* Additives; Coatings.
Steam Turbine Oils 89154
Synthetic Lubricants 89018 89035 89052 89070 89085 89086 89097 89117 89120 89125 89137 89154 89156
Vegetable Oils 89105
Water, Water-based 89011 89046 89067 89071 89107 89125

Lubrication—*see* Aerospace Lubrication; Aluminum Plant Lubrication; Automotive Lubrication; Bearings; Cams; Cement Mill Lubrication; Coatings; Compressors; Engines; Food Industry Lubrication; Gears; Grease; Hydraulic Systems; Lubricant Supply and Disposal; Lubricants; Lubrication Regimes; Lubrication Systems; Machine Tool Lubrication; Maintenance; Marine Lubrication; Materials; Metalworking; Metalworking Fluids; Nuclear Power Plant Lubrication; Pumps; Railroad Lubrication; Seals; Steel Mill Lubrication; Surface Roughness.

Lubrication Regimes—*see* Boundary Lubrication; Elastohydrodynamic Lubrication; Gas Lubrication; High-Temperature Lubrication; Hydrodynamic Lubrication; Hydrostatic Lubrication; Solid Lubrication; Squeeze-Film Lubrication; Surface Roughness; Vapor Phase Lubrication.

Lubrication Systems
Vapor Phase 89109
see also Grease; Metalworking Fluids.

Machine Tool Lubrication 89148 89163

Machining—*see* Metalworking.

Magnetic Bearings—*see* Bearings.

Magnetic Storage Systems Tribology 89033 89058 89115 to 89139

Maintenance 89107 89140 to 89167
see also Lubricant Analytical Techniques; Lubrication Systems.

Marine Lubrication 89022 89023 89157 89165

Marine Oils—*see* Lubricants.

Marketing—*see* Lubricant Supply and Disposal.

Materials, Lubrication and Properties of
Aluminum 89072 89080 89106 89136
Carbides 89043 89044 89049 89071 89081 89082 89090 89110
Carbon 89016 89116 89129 89131 89136
Ceramics 89001 89004 89011 89031 89042 89043 89046 89057 89082 89090 89131 89133 89137
Composites 89043 89116 89117
Copper 89050
Elastomeric 89092
Ferrites 89132
Iron 89013 89091
Lead 89006
Polymers 89048
Self-Lubricating 89116
Steel 89040 89055
Tin 89006
Titanium 89037

Measurement—*see* Friction; Lubricant Analytical Techniques; Testing Devices; Wear.

Metallurgical Effects 89006 89012 89040 89078 89112
see also Fatigue; Hardness Effects; Ion Implantation; Materials.

Metals—*see* Materials.

Metalworking
Forming 89106
Grinding 89093
Turning 89044 89147

Metalworking Fluids 89089 89096
Cutting 89091
Forming 89106

Grinding 89093
Rolling 89072 89077 89079 89080 89087
see also Additives; Additive Effects; Grease; Hygiene; Lubricant Analytical Techniques; Lubricant Chemical Properties; Lubricant Physical Properties; Lubricant Supply and Disposal; Lubrication Systems.

Mixed Lubrication—*see* Lubrication Regimes; Surface Roughness.

Needle Bearings—*see* Bearings, Roller.

Noise—*see* Acoustical Phenomena; Vibration.

Non-Newtonian Effects—*see* Lubricant Physical Properties; Lubrication Regimes.

Nuclear Power Plant Lubrication 89003 89082 89083

Oil Consumption 89103

Oil Whirl—*see* Hydrodynamic Lubrication, Stability.

Oils—*see* Lubricants; Metalworking Fluids.

Optical Phenomena 89017 89139 89140 89155

Oxidation—*see* Lubricant Analytical Techniques; Lubricant Chemical Properties.

Oxidation Inhibitors—*see* Additives, Antioxidants.

Oxide Layers—*see* Surface Films.

Packings—*see* Seals.

Particles—*see* Environmental Effects on Lubrication; Lubricant Analytical Techniques, Contaminants; Wear, Particles.

Petrol Engines—*see* Engines.

Piston Rings—*see* Compressors; Engines; Pumps; Seals.

Pitting—*see* Fatigue.

Plain Bearings—*see* Bearings, Hydrodynamic.

Polymers—*see* Additives, Solid Lubricant, Viscosity Index Improver; Coatings; Materials.

Preventative Maintenance—*see* Condition Monitoring; Lubrication Systems; Maintenance.

Pumps
Centrifugal 89003 89066 89071 89082 89083 89145
see also Compressors.

Railroad Lubrication 89095 89102 89103

Rheological Properties—*see* Lubricant Physical Properties.

Roller Bearings—*see* Bearings.

Rolling Contact Fatigue—*see* Fatigue.

Rolling Oils—*see* Metalworking Fluids.

Roughness—*see* Surface Roughness.

Rubber—*see* Materials, Elastomeric; Seals.

Safety 89091

Scuffing, Scoring 89039

Seals
Face 89003 89024 89071 89081 89082 89083 89084 89113
Gas 89024 89042 89081
Piston Rings 89099
Shaft (Rotating) 89003 89062 89082 89083
Static 89092

Self-Lubricating Bearings—*see* Bearings.

Self-Lubricating Materials—*see* Bearings; Friction; Materials; Wear.

Shear Stability—*see* Lubricant Physical Properties.

Solid Lubricant Coatings—*see* Coatings.

Solid Lubricant Dispersions—*see* Additives, Solid Lubricants.

Solid Lubrication 89016 89042 89116
see also Additives; Coatings; Friction; Wear.

Solvents 89017

Space—*see* Aerospace Lubrication; Environmental Effects.

Squeeze-Film Lubrication 89014 89056 89060 89128

Stability—*see* Hydrodynamic Lubrication; Vibration.

Steam Turbine Oils—*see* Lubricants.

Steam Turbines—*see* Engines.

Steel—*see* Materials; Metalworking; Steel Mill Lubrication.

Steel Mill Lubrication 89107

Stick-slip—*see* Friction.

Stress Analysis 89001 89040 89155
see also Contact.

Surface Chemical Analysis 89010 89032 89053 89055 89080 89099 89112

Surface Energy 89017 89067

Surface Fatigue—*see* Fatigue.

Surface Films 89004 89005 89006 89010 89013 89016 89030 89032 89046 89053 89055 89071 89080 89099 89109 89110 89116 89117 89120 89125 89127 89129 89131 89136 89137
see also Coatings.

Surface Roughness
Analysis 89064 89119 89126
Contact 89033
Effect on Lubrication 89005 89037 89064 89113 89117 89126 89138 89139
Measurement 89119 89126

Surface Tension—*see* Lubricant Physical Properties.

Synthetic Lubricants—*see* Lubricants.

Testing Devices
Bearings 89005 89006 89014 89021 89025 89034 89061 89162
Cams 89078
Engines 89073 89094 89099
Fatigue—*see* Fatigue.
Friction—*see* Friction.
Grease 89026 89160
Lubricants—*see* Lubricant Analytical Techniques.
Lubricant Film Thickness 89120
Magnetic Storage Systems 89058 89116 89117 89122 89123 89124 89125 89126 89127 89131 89132 89133 89134 89136 89137 89139
Materials 89006
Seals 89003 89042 89071 89081 89082 89083 89084 89113
Traction 89054
Wear—*see* Wear.

Thermal Effects—*see* Lubricant Analytical Techniques; Lubricant Chemical Properties; Lubricant Physical Properties; Lubrication Regimes.

Tilting-Pad Bearings—*see* Bearings.

Tin—*see* Materials.

Titanium—*see* Materials.

Toxicology—*see* Additives, Antimicrobial; Hygiene.

Traction—*see* Elastohydrodynamic Lubrication, Traction; Friction, Elastohydrodynamic; Lubricant Physical Properties; Lubricants; Testing Devices, Traction.

Tribology—*see* Lubrication; Lubrication Regimes.

Turbine Lubricants—*see* Lubricants.

Turbines—*see* Engines.

Turning—*see* Metalworking.

Vacuum—*see* Aerospace Lubrication, Space; Environmental Effects.

Vapor Phase Lubrication 89014 89109
see also Lubrication Systems.

Vapor Pressure—*see* Lubricant Physical Properties.

Vegatable Oils—*see* Lubricants.

Vibration 89022 89023 89066 89147
see also Acoustical Phenomena; Hydrodynamic Lubrication, Stability.

Viscosity—*see* Lubricant Physical Properties.

Viscosity Index Improvers—*see* Additives.

Volatility—*see* Lubricant Physical Properties.

Water—*see* Environmental Effects, Humidity; Lubricants.

Wear 89100
Abrasive 89012 89078 89090 89100 89107 89112 89121
Boundary Lubricated 89005 89010 89030 89032 89046 89050 89053 89057 89065 89070 89105 89111 89112 89137
Cavitation Erosion 89049
Erosive 89100
Fatigue 89001 89078 89107 89112 89127 89136
Fretting 89019
Mechanisms 89001 89005 89011 89012 89057 89159 89165
Particles 89005 89012 89036 89037 89050 89068 89076 89081 89098 89101 89121 89122 89140 89146 89150 89151 89152 89158 89159 89160 89161 89164
Self-Lubricated Materials 89004 89006 89048 89116 89129 89131 89132 89133
Solid Lubricated 89016 89116 89129
Testing Devices (novel) 89131 89133 89147
Unlubricated 89001 89004 89005 89006 89011 89012 89043 89044 89081 89116 89137

1989 Author Index

A

Adamo, R. 89098
Adams, G. G. 89115
Agarwal, A. K. 89116
Alexander, D. L. 89114
Allaire, P. E. 89022
Allard, L. F. 89043
Anderson, D. P. 89140
Arai, T. 89117
Arsic, S. 89088

B

Baba, Y. 89059
Barber, S. A. 89039
Barnes, J. R. 89097
Bauer, C. L. 89116
Belin, M. 89053
Bell, J. C. 89097
Benson, R. C. 89130
Berryman, F. 89162
Berthier, Y. 89063
Bhargava, S. K. 89009, 89040
Blanchet, T. A. 89048
Blau, P. J. 89100
Bogy, D. B. 89138, 89139
Boyce, M. P. 89145
Brandt, J. 89133
Braza, J. F. 89001, 89057
Brendle, M. 89063
Brewe, D. E. 89020
Bridger, K. 89065
Brockman, N. L. 89106
Brockwell, K. R. 89034
Brown, K. J. 89154
Buckley, D. H. 89049

C

Cann, P. M. 89054
Carfagni, M. 89155
Carreau, P. J. 89021
Centers, P. W. 89052, 89146
Chang, C. H. 89124
Chang, S. T. 89073
Cheek, G. T. 89156
Chen, G. J. 89018
Chen, H. M. 89002
Chen, J. 89147
Cheng, H. S. 89001, 89047, 89057
Childers, J. C. 89096
Chiu, Y. P. 89015
Chu, C. Y. 89073
Citti, P. 89155
Clayton, P. 89095
Colynuck, A. J. 89045
Corso, S. 89098

D

Dahlstrom, P. L. 89099
Daitoh, H. 89058
Dalley, R. J. 89158
Danks, D. 89095
De Hoff, R. L. 89167
DellaCorte, C. 89042
Deng, K. 89157
Derdouri, A. 89021
Dien, I. K. 89051
Dominguez, D. D. 89156
Du, Y. P. 89161
Duda, J. L. 89109

F

Fantozzi, G. 89011
Farris, T. N. 89019
Feng, X. 89144, 89153
Fenske, G. R. 89044
Fijnvandraat, J. G. 89132
Fine, M. E. 89001, 89057
Fisher, G. C. 89159
Fisher, R. 89126
Fiumano, F. A. 89093
Fragoulis, A. N. 89094
Frenster, J. A. 89167
Fujita, T. 89003
Fultz, G. W. 89035
Furuhama, S. 89059
Fusaro, R. L. 89016

G

Gangopadhyay, A. K. 89001
Gardos, M. N. 89004
Gates, R. S. 89046, 89055
Gerhardt, L. J. 89017
Gladue, R. 89086
Godet, M. 89005, 89063
Godfrey, D. 89068
Gondo, S. 89032
Gopalakrishnan, S. 89062
Goto, F. 89137
Granick, S. 89031
Gschwender, L. J. 89018, 89035
Gupta, V. K. 89018, 89035

H

Hahn, F. W. Jr. 89118
Hahn, G. T. 89040
Ham, G. L. 89040
Hamer, J. C. 89036
Hamilton, G. D. S. 89103
Hanson, M. T. 89019
Harper, M. A. 89116
Harris, T. A. 89104
Hashemi, S. M. R. 89056, 89060
Hattori, S. 89049
Heenan, D. F. 89072
Heiman, N. 89126
Henein, N. A. 89094
Heshmat, H. 89005, 89081
Hirabayashi, H. 89003, 89113
Hoh, S. M. 89163
Hombek, R. 89072
Homer, K. E. 89141
Homerin, P. 89011
Hoshi, M. 89059
Hoshino, M. 89120
Hsieh, S. K. 89073
Hsu, S. M. 89046, 89055, 89065, 89069
Humphris, R. R. 89023

I

Inanaga, K. 89127
Ioannides, E. 89036
Izraelev, V. M. 89119

J

Jain, S. C. 89008, 89038
Jain, V. K. 89070
Januszkiewicz, K. R. 89072
Jeng, G. S. 89109
Jewett, K. L. 89055
Johnston, K. D. 89148
Jones, M. H. 89160
Jongh, J. J. M. 89030
Joseph, J. J. 89077

K

Kadijk, S. E. 89132
Kamo, R. 89090
Kane, T. R. 89033
Kannel, J. W. 89039
Kapuscinski, M. M. 89114
Kato, K. 89006
Kauffman, R. E. 89076, 89108
Kawasaki, M. 89075
Kayaba, T. 89006
Keer, L. M. 89001, 89019
Keith, T. G. Jr. 89027, 89028
Keller, M. A. 89085
Kennedy, F. E. Jr. 89048, 89131
Kennedy, J. S. 89007
Key, W. E. 89062
Khan, M. R. 89126
Khonsari, M. M. 89020
Kimachi, Y. 89120
Kimura Y. 89067
Kipp, E. M. 89087
Kirk, T. E. 89087
Kiryu, K. 89071, 89113
Klaus, E. E. 89046, 89109
Kleinbub, D. 89034
Klimek, E. J. 89110
Koga, T. 89003, 89071
Kojima, H. 89075
Koka, R. 89121, 89122
Kreuz, K. L. 89099
Krynicki, K. 89066
Kumaran, A. R. 89123, 89124
Kuo, L. L. K. 89073
Kyle, D. J. 89086

L

Laffin, M. V. Jr. 89114
Law, A. B. 89089
Lawson, R. 89069
Lebeck, A. O. 89084
Leder, J. 89079
Leonhard, M. 89025
Leugner, L. O. 89101
Lewis, D. W. 89022, 89023
Lewis, R. T. 89151
Li, Z. 89125
Lin, R. Z. W. 89166
Ling, F. F. 89064
Lipschitz, A. 89024
Little, L. 89092
Liu, J. 89150, 89157
Liu, Z. 89144, 89153
Lockwood, F. E. 89065
Logan, M. R. 89102, 89103
Lue, K. 89123
Lukas, M. 89142

M

Maheswari, S. P. 89013
Malik, M. 89008, 89009
Mani, G. 89145
Mansot, J. L. 89053
Marchon, B. 89126
Marsi, J. A. 89083

Martin, J. M. 89053
Martin, K. F. 89148, 89163
Mayer, E. 89082
Medley, J. B. 89045
Mee, P. 89129
Meher-Homji, C. B. 89145
Merchant, K. 89129
Michie, P. 89162
Miyake, Y. 89058
Miyoshi, K. 89049
Molyneaux, A. K. 89025
Morris, P. L. 89106
Mosher, E. 89091
Mowery, R. L. 89156

N

Nakajima, T. 89113
Nakazawa, K. 89003
Namura, K. 89127
Natarajan, B. R. 89133
Needelman, W. M. 89093
Nichols, A. H. 89094

O

O'Connor, B. M. 89078
Odaka, T. 89058
Odi-Owei, S. 89105
Ohmae, N. 89127
Okada, K. 89067
Okada, T. 89049
Orange, G. 89011
Osaki, H. 89006
Ota, H. 89127

P

Pal, R. 89029
Papay, A. G. 89074
Papke, B. L. 89099
Parszewski, Z. A. 89066
Patterson, G. H. 89078
Payvar, P. 89062
Pei, P. 89069
Pilli, S. C. 89038
Pinkus, O. 89005
Plaza, S. 89010
Ponnaganti, V. 89033
Prashad, H. 89026
Price, F. D. 89052

R

Rabinowicz, E. 89125
Rahmatabadi, A. D. 89008
Rankin, D. 89143
Reba, R. M. 89112
Rhim, Y. 89061
Riddle, B. L. 89087
Roberts, D. 89167
Roby, S. H. 89078, 89112
Rodkiewicz, C. M. 89007
Rounds, F. G. 89111
Roylance, B. J. 89056, 89060
Rubin, C. A. 89040
Rush, R. E. 89107
Russo, M. R. 89079
Rylander, H. G. Jr. 89041

S

Saba, C. S. 89070, 89085
Sabhapathy, P. 89007
Saka, N. 89037, 89050, 89125
Sakai, T. 89075
Salant, R. F. 89062
Santoro, S. K. 89152
Sasaki, A. 89075
Sayles, R. S. 89036
Seifert, W. W. 89152
Shamah, E. 89102
Shang, L. 89051
Shapiro, W. 89081
Shi, Y. 89144, 89153
Shih, C. Y. 89116
Shimomura, T. 89071, 89113
Singh, D. V. 89029
Sinhasan, R. 89009, 89029, 89038
Sköld, R. 89091
Smallen, M. 89129
Smith, D. P. 89128
Smith, S. 89129
Smulders, A. 89162
Snyder, C. E. Jr. 89018, 89035
Sogabe, T. 89003
Sokolovic, S. 89088
Song, D. X. 89161
Spikes, H. A. 89054
Staniewski, J. W. 89154
Stanley, R. M. 89103
Steele, R. K. 89095
Suh, N. P. 89037, 89050
Sulek, H. H. 89072
Sundaram, R. 89130
Suzuki, S. 89131

T

Tagami, K. 89117
Takayama, S. 89075
Takeshita, K. 89003
Takeuchi, Y. 89058
Talke, F. E. 89123
Tanaka, K. 89058
Tang, B. 89165
Terada, A. 89120
Terada, Y. 89134
Thevenot, F. 89011
Thomas, P. W. 89022, 89023
Thorpe, P. 89163
Tian, H. 89037, 89050
Tichy, J. A. 89061
Todoroki, T. 89003
Trabelsi, R. 89011
Treheux, D. 89011
Treverton, J. A. 89080
Tsuchiya, K. 89071
Tsukamoto, Y. 89136, 89137
Tung, C. Y. 89073
Tung, S. C. 89013

V

Vaghasia, G. 89062
Vaidyanathan, K. 89027
Vail, P. 89086
Vaidmanis, E. 89090
Van Alsten, J. 89031
Van Der Spek, R. 89149
Van Groenou, A. B. 89132
Van Helden, A. K ..... 89030.
Vance, J. M. 89014
Vaughn, M. R. 89041
Veinot, D. E. 89159
Verbunt, J. P. M. 89132
Vermeiren, K. 89162
Vierk, S. 89126
Vijayaraghavan, D. 89028
Von Behren, R. A. 89128
Vroegop, P. H. 89030

W

Walmsley, R. G. 89133
Wang, N. 89012
Wang, S. S. 89013
Wang, X. 89164
Watanabe, M. 89134
Wayner, P. C. Jr. 89017
Wedeven, L. D. 89104
Weeks, S. 89069
Westcott, V. C. 89152
White, J. W. 89033, 89135
Worden, R. E. 89001
Wright, M. S. 89070
Wright, R. L. 89146

X

Xei, S. 89144
Xing, Z. 89165
Xu, D. 89147

Y

Yamada, T. 89134
Yamamoto, Y. 89032
Yanagisawa, M. 89136, 89137
Yang, Z. 89164
Yin, L. 89147
Yonehara, Y. 89071
Young, L. A. 89084
Yust, C. S. 89043

Z

Zahn, C. C. 89124
Zeidan, F. Y. 89014
Zeng, Z. X. 89161
Zhong, S. 89147
Zhu, D. 89047
Zhu, L. Y. 89138, 89139